

REMARKS

Status of Claims

Claims 1, 2, 5-18, 21-22, 25-27, 30-38 and new claim 39 are currently pending, with claims 1, 25 and 32 being independent. New claim 39 has been added to a particularly preferred embodiment of the present invention. Support for the new claim can be found throughout the specification including, for example, in paragraph 44.

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the attached Declaration Under 37 C.F.R. § 1.132, the foregoing amendments, and the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1, 2, 5-18, 21, 25-27, 30-31 and 34-38 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over U.S. Patent No. 2,877,257 (“Cain”) in view of U.S. Publication No. 2002/0173556 (“Moore”). Claim 22 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Cain in view of Moore and further in view of U.S. Patent No. 6,476,086 (“Zhou”). Claims 32 and 33 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Cain in view of Moore et al. and further in view of Zhou.

Applicants respectfully disagree with these rejections; therefore, the rejections are traversed. In support of this traversal, Applicants attach a Declaration Under 37 C.F.R. § 1.132 by Burtron H. Davis (hereinafter the “Declaration”).

As explained in the Declaration by one of skill in the art, one of skill in the art would not agree with the rejections as set forth in the Office action for at least the following reasons:

A person skilled in the art at the filing date of the present application (July 2, 2003) would have had no expectation of Al contamination in a waxy paraffinic product stream produced using the parameters claimed in the independent claims of Bull. In particular a skilled person would not have expected contamination that is not filterable down to 0.1 micron and believed to comprise aluminum metal present in a complex organic matrix.

A person skilled in the art would understand that there is no equivalent of the primary oil stream that is treated by the process of Cain (containing large amounts, ranging from 10 to 30 %, of organic chemicals such as acids, alcohols, ketones, aldehydes, esters, etc.) when conducting a

Fischer-Tropsch process using the parameters as claimed in the independent claims of Bull. In particular, the waxy paraffinic stream treated in the process of Bull has a very low oxygenate content.

It consequently would have been illogical for a skilled person to modify the process of Cain by using a cobalt catalyst and a slurry reactor as suggested by Moore. Rather, a skilled person would have regarded the teaching of Cain as being irrelevant to a Fischer-Tropsch synthesis process using the parameters claimed in the independent claims of Bull.

Accordingly, in view of the Declaration, Applicants respectfully request that the § 103(a) rejections be withdrawn.

Applicants further maintain their previously asserted reasons for traversing the § 103(a) rejections. Applicants note that independent claims 1, 25, and 32 specify that it is a Fischer Tropsch derived *waxy paraffinic product stream* that is being treated in the presently claimed methods.

The nature of the stream being treated in the presently claimed methods is significantly different from the steam in Cain.

Applicants note that Fischer-Tropsch syntheses produce a wide range of hydrocarbon and oxygenated products. Two factors influencing the nature of the products are the catalyst type and operating temperature. In general, operation at higher temperatures results in a lighter product spectrum than when operating at low temperatures. As previously submitted, “Steynberg and Dry” provide information regarding what one of skill in the art understood regarding the nature of Fischer Tropsch derived product streams.

For Fischer-Tropsch product streams, the amount of alkanes increases as the fractions get heavier, whereas the alkenes and oxygenates decrease as the fractions get heavier, with alkene production higher than oxygenate production. Iron catalysts under the conditions of Cain produces far more oxygenates and alkenes than a cobalt catalyst under the presently claimed conditions.

Cain discloses that the hydrocarbon stream contains between 10 and 30 % of organic chemicals such as acids, alcohols, ketones, aldehydes, esters, etc. (i.e. oxygenates) (column 1, lines 36-39). In the process of Cain, there is no continuous liquid phase within the reactor and the reactor operates as a two-phase gas-solid process. The result is that all products formed exit

the reactor with this gaseous phase (i.e. there is no liquid phase product withdrawn from the reactor). The dissolved or occluded metal contaminants, such as iron or iron compounds, considered in Cain are, therefore, withdrawn together with the gaseous phase which exits the reactor.

In contrast with Cain, the independent claims specify that the hydrocarbon stream to be treated is a **waxy paraffinic product steam** produced in a slurry type reactor using a catalyst comprising cobalt at a temperature between 400 and 550 °F (204 and 288 °C). A slurry type reactor operates as a three-phase gas-liquid-solid process and produces both products that are gaseous and liquid at the reactor operating conditions (paragraph 53, paragraph 79 and paragraph 98). Accordingly, there is a vapor product stream and also a liquid product stream leaving the reactor. The vapor stream is predominantly the lighter products, while the liquid stream is predominantly waxy (C₂₀₊). Claims 1, 25, and 32 are concerned with the treatment of this predominantly waxy liquid stream withdrawn from the reactor.

The predominantly waxy liquid stream, forming the subject of the present claims, has low olefin and oxygenate content, appreciably lower than what is considered in Cain. Oxygenates and olefins are present in the lighter fractions produced using such slurry cobalt processes and not in the waxy paraffinic stream that is the subject of the presently claimed method.

The presently claimed method relates to contamination withdrawn from the slurry reactor together with the **liquid phase**. The present application states that prior art processes utilizing filtration (usually capable of removing particles down to 1 micron in size) is not effective at removing the contamination (paragraph 12). In addition, the contamination may still be present when the hydrocarbon stream is filtered to remove particles larger than about 0.1 microns (paragraph 42). It is believed that the contamination may comprise aluminum metal present in a complex organic matrix consisting of at least one or more organic components (paragraph 77).

The present invention is thus concerned with the problem of removal of contamination comprising aluminum metal present in a complex organic matrix from a **waxy paraffinic product stream** withdrawn in liquid form from a slurry reactor.

In contrast, Cain is concerned with the removal of dissolved or occluded iron or iron compounds from a hydrocarbon stream containing between 10 and 30 % oxygenates that is withdrawn together with the gaseous phase from a fluidized bed reactor. It is respectfully

submitted that a skilled person faced with the difficulty of removing contamination comprising aluminum metal present in a complex organic matrix from a waxy paraffinic product stream withdrawn in liquid form from a slurry reactor, will have no incentive to consider the teaching of Cain. None of the other prior art documents of record remedies this defect.

Even if combined, Cain in view of Moore does not disclose or suggest the presently claimed methods of removing contamination from a Fischer-Tropsch derived waxy paraffinic product stream. Cain in view of Moore does not disclose or suggest a method comprising conducting a Fischer-Tropsch process in a slurry type reactor using a catalyst comprising cobalt at a temperature range of about 400 to 550°F to produce a Fischer-Tropsch derived waxy paraffinic product stream; passing the Fischer-Tropsch derived waxy paraffinic product stream to a treatment zone; passing an aqueous acidic stream to the treatment zone; contacting the Fischer-Tropsch derived waxy paraffinic product stream with the aqueous acidic stream in the treatment zone to form a mixed stream containing Al contamination in particulate form; separating the mixed stream into at least one acidic extracted Fischer-Tropsch derived waxy paraffinic product stream, and at least one modified aqueous acidic stream; passing the at least one acidic extracted Fischer-Tropsch derived waxy paraffinic product stream to a hydroprocessing reactor containing catalyst beds; and hydroprocessing the acidic extracted Fischer-Tropsch derived waxy paraffinic product stream to provide a hydroprocessed product stream, wherein the contacting step substantially reduces plugging of catalyst beds in the hydroprocessing reactor.

Moreover, even if combined, Cain in view of Moore does not disclose or suggest a method comprising passing an aqueous acidic stream to the treatment zone; extracting Al contamination from the Fischer-Tropsch derived waxy paraffinic product stream by contacting the Fischer-Tropsch derived waxy paraffinic product stream with the aqueous acidic stream in the treatment zone at extraction conditions to form a mixed stream comprising at least one acidic extracted Fischer-Tropsch derived waxy paraffinic product stream, a modified aqueous acidic stream, and a third phase; and separating the at least one acidic Fischer-Tropsch derived waxy paraffinic product stream from the modified aqueous acidic stream and the third phase, wherein after the extraction step the contamination contained in the modified aqueous acidic stream and the third phase is greater than the contamination contained in the extracted Fischer-Tropsch derived waxy paraffinic product stream.

Similar reasoning applies in respect of claims 1, 25 and 32.

Specifically with regard to the rejection of claim 22, Applicants provide the following additional comments.

As described above, Cain does not disclose or suggest a method for removing contamination from a *Fischer-Tropsch derived waxy paraffinic product*. As discussed above, Cain relates to a process for the purification of *hydrocarbon solutions of oxygenated organic compounds* comprising acids. Accordingly, the product stream of the presently claimed process and the product stream of Cain are significantly different. Therefore, Applicants respectfully submit that one of skill in the art would not look to Cain for guidance when faced with the problem of removing Al contamination from a paraffinic stream.

Cain in view of Moore does not disclose or suggest a method for removing contamination from a *Fischer-Tropsch derived waxy paraffinic product*. Cain in view of Moore does not disclose or suggest removing *Al contamination in particulate form*. Moreover, Applicants respectfully submit that Cain in view of Moore does not disclose or suggest filtering the at least one acidic extracted Fischer-Tropsch derived hydrocarbon stream to remove at least a portion of the Al contamination in particulate form.

Zhou is cited merely as disclosing using a surfactant and disclosing filtration techniques to separate solid contaminants.

As cited, Zhou does not correct the many above-noted deficiencies of Cain in view of Moore.

Specifically with regard to the rejection of claims 32 and 33, Applicants provide the following additional comments.

As described above, Cain relates to a process for the purification of hydrocarbon solutions of *oxygenated organic compounds comprising acids* and which also may contain dissolved or occluded metal contaminants such as iron or iron compounds.

Also as described above, Moore is cited as disclosing that Fischer Tropsch streams are produced in processes that utilize iron or cobalt catalysts. Moore is also cited as disclosing “that F-T derived streams may be fractionated (i.e., distilled) and hydrotreated.”

Zhou relates to a method for separating iron-based catalyst fines from hydrocarbon liquid/wax/catalyst slurry for Fischer-Tropsch synthesis processes by contacting and/or mixing the slurry with a coalescence enhancing treating solution to facilitate gravity separation and settling of such catalyst, and thereby yield a substantially clean hydrocarbon liquid/wax product. (Abstract). Zhou discloses that the treating solution includes a surface tension reducing agent, an agglutinating agent, and a coalescing agent, each in selected proportions in aqueous solution. (Abstract). Zhou is cited as disclosing filtration techniques used to separate solid contaminants from Fischer Tropsch derived streams.

As described above, the presently claimed process is significantly different than the process of Cain and one of skill in the art would not merely combine process features of Moore with Cain.

Moreover, it is respectfully maintained that in no way does Cain, Moore, or Zhou disclose or suggest providing an additive to the contents of the Fischer-Tropsch reactor to precipitate soluble contamination within the reactor. Applicants note that the Examiner asserts that it would have been obvious to one having ordinary skill in the art to have modified the process of Cain by adding the acid to the reactor because the same purification would take place with the added benefit of cost savings due to the reduced equipment requirement.

Applicants maintain that it would not be practical or of added benefit to add a water solution of acetic acid to the Fischer Tropsch reactor. Fischer Tropsch reactions are conducted at temperatures of 400 – 550 °F, as presently claimed. A water solution would significantly cool the reactor causing the reactor to need to be reheated to reaction temperature to conduct Fischer Tropsch reactions. Furthermore, a water solution would evaporate at the reaction temperatures, and thus, could not be used to extract the product inside the reactor, unless first the reactor was cooled significantly and then heated again to reaction temperature. All of these possibilities for using the water solution in the reactor would not be practical or of added benefit, if possible at all.

Therefore, for at least the above reasons and in light of the Declaration, Applicants request that the § 103(a) rejections be withdrawn.

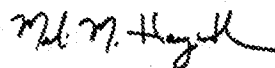
Conclusion

For the reasons noted above and in light of the Declaration, the art of record does not disclose or suggest the inventive concept of the present methods as defined by the claims.

In view of the foregoing amendments and remarks and the attached Declaration, reconsideration of the claims and allowance of the subject application is earnestly solicited. In the event that there are any questions relating to this application, it would be appreciated if the Examiner could telephone the undersigned attorney concerning such arguments so that prosecution of this application may be expedited.

If necessary for a timely response, this paper should be considered as a petition for an Extension of Time, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #70212.0001US01).

Respectfully submitted,



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